



Description of Lake Water Quality Parameters

Below are brief descriptions of frequently measured lake parameters and general descriptive categories of what certain concentrations may mean in terms of lake quality. Please note that these are general categories and others may group the data differently.

Apparent color

Apparent color is a visual measure with the naked eye of the color of the water. Color is generally caused by decaying organic matter and by naturally occurring metals in the soils such as iron and manganese. A highly colored lake generally has extensive wetlands along the shore or within the watershed. The median color in the surface waters of all NH lakes is 28.

Color categories (units):

0 – 25	clear
25 – 40	light tea-color
40 – 80	tea color
> 80	dark tea color

Chloride

Chloride is the anion associated with salts such as sodium chloride, potassium chloride and calcium chloride. Background levels of chloride in NH ponds are low, generally below the detectable value of 2 to 3 mg/L. Sources of chloride to lakes above background levels include road salt runoff, septage leachate (salts in food) and sea spray for coastal ponds. Except for a few coastal ponds, road salt runoff appears to be the major source of chloride to ponds, with the highest values found in urban ponds or ponds adjacent to major highways. The categories below assume road salt as the major source. The median summer, surface water value for chloride in all NH ponds is 4 mg/L.

Chloride categories (mg/L):

< 3	background
3 – 10	minor road salt runoff
10 – 30	moderate road salt runoff
30 – 230	major road salt runoff
> 230	exceeds the chronic value for protecting freshwater aquatic life

Chlorophyll *a*, corrected and uncorrected for pheophytin

All green plants contain chlorophyll *a*. The measurement of chlorophyll *a* in water is used to estimate the total biomass (or amount by weight) of planktonic algae (phytoplankton) in the lake. Pheophytin is one of several chlorophyll degradation products and, if present, can interfere with the analysis of chlorophyll. Uncorrected values may over estimate the chlorophyll concentration if substantial pheophytin is present. The median chlorophyll *a* (uncorrected for pheophytin) for all NH lakes is 4.58 ug/L.

Chlorophyll *a* categories uncorrected for pheophytin (ug/L):

< 4	excellent
4 - 8	good
8 - 16	more than desirable
> 16	nuisance amounts

Gran acid neutralizing capacity

This is the acid neutralizing capacity (ANC) of the water as measured by the Gran plot method. It is also known as alkalinity and is a measure of the buffering capacity of lake water or its ability to neutralize acid inputs. Most New Hampshire lakes naturally have low ANC values due to the granitic bedrock (no carbonate to neutralize acids). Approximately 85% of New Hampshire lakes are at least highly sensitive to acid inputs (ANC < 10 mg/L). The median ANC in the summer upper water layer for all NH lakes is 4.9 mg/L.

ANC sensitivity categories (mg/L):

<= 0	acidified
>0 - 2	critical
>2 - 5	endangered
>5 - 10	highly sensitive
>10 - 20	sensitive
> 20	not sensitive

pH

A measure of the hydrogen ion activity in the water or, in general terms, the acidity of the water. The granitic bedrock of New Hampshire naturally causes New Hampshire lakes to be slightly acidic (just below the neutral value of 7). Organic acids (natural from decomposing organic matter in wetlands - also resulting in tea-colored waters) and acid deposition (mostly from man-made sources) can further increase the acidity of the water (a decrease in pH). As the pH decreases to below 6 (more acidic), aquatic organisms including fish may become stressed, and species begin to disappear as the pH decreases further. Little or no fish life is present when the pH falls much below 5. pH values tend to be lower in the winter as compared to the summer, and lower in the bottom waters as compared to surface waters. The median pH in the summer, surface waters of all NH lakes is 6.6.

pH categories (units):

< 5	acidified
5 - 5.5	critical
5.5 - 6	endangered
> 6	satisfactory

Phosphorus as P

Phosphorus as P is the total phosphorus, expressed as the element P rather than as the orthophosphate ion PO_4 . Total phosphorus is a measure of all forms of phosphorus in the water, including both inorganic and organic forms. It is generally the plant nutrient that is limiting in New Hampshire lake waters. In other words, the amount of phosphorus present in the water column determines the amount of planktonic algae that will grow in the lake. High phosphorus values generally reflect high algae or chlorophyll *a* values. Phosphorus values are frequently elevated in the bottom waters of a lake, particularly if the bottom waters are anoxic (little or no dissolved oxygen). The median summer, surface water concentration of phosphorus for all NH lakes is 0.012 mg/L.

Phosphorus categories (mg/L as P):

< 0.010	ideal
0.010 - 0.020	average
0.020 - 0.040	more than desirable
> 0.040	excessive (nuisance amounts)

Secchi disk transparency

A measure of the water clarity as determined by the naked eye viewing a 20 centimeter black and white disk lowered into the water column until it disappears from view. It is generally correlated with the amount of planktonic algae in the lake unless the lake is turbid from suspended soil particles (generally a temporary condition from localized erosion). The median summer Secchi disk transparency value for all NH lakes (not using a view scope) is 10.5 feet.

Secchi categories (ft):

< 4	poor
4 - 15	good
> 15	excellent

Trophic class

The trophic class of the lake, as determined by NHDES, is a measure of the biological production that occurs in the lake. It is based on planktonic algae growth, as measured by chlorophyll *a* and Secchi disk transparency, macrophyte abundance, and the amount of dissolved oxygen in the bottom waters (hypolimnion) of stratified lakes. The first two parameters are indirectly linked to the phosphorus (nutrient) status of the lake.

Trophic categories:

Oligotrophic	Nutrient poor lakes with minimal levels of algae or macrophyte growth and good to excellent water clarity. Tend to be larger and/or deeper lakes with sandy/rocky shoreline. Generally dissolved oxygen is present even in the deepest waters of the lake.
Mesotrophic	An intermediate stage between oligotrophic and eutrophic and may exhibit conditions shared by both. Algae and water clarity are average and dissolved oxygen may be depleted in the bottom waters.
Eutrophic	Nutrient rich lakes with abundant algae and macrophyte growth. Tend to be shallower lakes with mucky bottom sediments and often tea colored. Generally support only warmwater fisheries due to dissolved oxygen depletion in the bottom waters.

Using the most recent available data for NH's significant, publicly owned lakes, the number of lakes and total lake area in the three trophic classes is portrayed in the table below.

Class	Number of lakes	Percent	Area (ac) of lakes	Percent
Oligotrophic	197	28 %	115,127	74 %
Mesotrophic	356	51 %	33,574	22 %
Eutrophic	149	21 %	7,004	4 %
Totals	702	100 %	155,705	100 %

Note the difference in percentages between the number of lakes and the acreage of lakes. Large lakes tend to be oligotrophic and small lakes eutrophic.

Vascular plant abundance

Vascular plants are the submerged and emergent rooted aquatic plants (macrophytes) growing in a lake. The abundance rating is a subjective evaluation of the amount of these plants in the lake. The type and abundance of vascular plants is more a reflection of sediment type, water depth, and exposure to wind and wave action than it is of trophic (nutrient) status. Vascular plants generally obtain their nutrient requirements directly from the sediment and not the water column. These plants are beneficial to a healthy lake ecosystem but may interfere with man's activities when abundant.

Vascular plant abundance categories:

Sparse	Few emergent plants observed; submerged plants not obvious.
Scattered	Several small patches or one or two large patches of plants, or much of the shoreline with a sparsely growing plant present; submerged plants not obvious.
Scattered/common	Intermediate between scattered and common.
Common	Submerged or emergent plants around most of the shoreline but not a problem to navigation, or several large patches of plants present.
Common/abundant	Intermediate between common and abundant.
Abundant	Submerged and/or emergent plants around the entire shoreline and with thick patches in some areas.
Very abundant	At least ½ of the surface area with emergent plants or submerged plants thick throughout the lake; navigation and swimming are impaired.